

What Is Claimed Is:

1. A method for phosphating metal layers by electrolytic depositing from acid aqueous solutions which contain at least zinc ions and phosphate ions, while simultaneously applying direct current, wherein simultaneously with the depositing of the phosphating layer, an electrolytic depositing of zinc takes place in the same electrolyte, the current density being greater than  $-5 \text{ A/dm}^2$ .
2. The method as recited in Claim 1, wherein the current density is in the range of  $-5$  to  $-50 \text{ A/dm}^2$ .
3. The method as recited in Claim 1 or 2, wherein the temperature amounts to  $> 40^\circ\text{C}$  and is preferably between  $40$  and  $80^\circ\text{C}$ , especially between  $60$  and  $70^\circ\text{C}$ .
4. The method as recited in one of Claims 1 through 3, wherein the electrolyte contains zinc ions in the range of  $> 5 \text{ g/l}$ , especially in the range of  $5$ - $50 \text{ g/l}$ , and phosphate ions in the range of  $> 10 \text{ g/l}$ , especially in the range of  $10$ - $80 \text{ g/l}$ .
5. The method as recited in one of Claims 1 through 4, wherein the acid aqueous solutions additionally contain ions of elements that are able to form an alloy with zinc, so that when there is a deposit of a phosphating layer, a deposit of zinc and/or zinc alloys takes place simultaneously.
6. The method as recited in Claim 5, wherein instead of the ions, nanoparticles or organic molecules are used.
7. The method as recited in Claim 5, wherein the additional ions are the ions of a divalent metal M.
8. The method as recited in Claim 7, wherein the additional divalent metal M is selected from the group made up of Ni, Fe, Co, Cu, Mn and the like.

9. The method as recited in one of the preceding claims,  
wherein the metal layers are selected from the group made up of stainless steel,  
bronze, Al, Al alloys, Cu, Cu alloys, Ni, Ni alloys, etc.
10. The method as recited in one of the preceding claims,  
wherein the pH value of the electrolyte lies between approximately 1.5 and  
approximately 4, preferably between approximately 2.5 and approximately 3.5.
11. The method as recited in one of the preceding claims,  
wherein an accelerator is added to the electrolyte.
12. The method as recited in Claim 11,  
wherein the accelerator is selected from the group made up of urea, nitrate, nitrite,  
chlorate, bromate, hydrogen peroxide, ozone, organic nitro bodies, peroxy  
compounds, hydroxylamine or mixtures thereof.
13. The method as recited in Claim 7,  
wherein the metal ions of the divalent metal M are supplied by anodic dissolution of  
the electrolyte.
14. The method as recited in one of the preceding claims,  
wherein Zn, Ni, Co and/or Mn salts are additionally added to the electrolyte.
15. The method as recited in one of the preceding claims,  
wherein the electrolyte has the following composition:
  - $\text{Zn}^{2+}$ : 5-40 g/l
  - $\text{M}^{2+}$  0.5-10 g/l
  - $\text{H}_2\text{PO}_4^-$ : 10-40 g/l and
  - $\text{NO}_3^-$  1-10 g/l
16. The method as recited in one of the preceding claims,  
wherein the electrolysis is performed either in a potentiostatic or a galvanostatic  
manner or a mixture of the two components.

17. The method as recited in one of the preceding claims,  
wherein the layer thickness distribution on the metal layers is regulated by the local  
current density.
18. The method as recited in one of the preceding claims,  
wherein the direct current is pulsed.
19. The method as recited in one of the preceding claims,  
wherein the speed of the layer formation lies in the range of approximately 3 to  
approximately 20  $\mu\text{m}/\text{min}$ .
20. A metal layer having a porous zinc phosphate layer deposited on it,  
wherein the pores of the zinc phosphate layer are filled with metallic zinc and/or zinc  
alloy.